UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I - NEW ENGLAND
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES.

NPDES PERMIT NO. : **MA0100196**

NAME AND ADDRESS OF APPLICANT:

Town of Upton
P.O. Box 75
Upton, MA 01568

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Upton Wastewater Treatment Facility
43 Maple Street
Upton, MA 01568

RECEIVING WATER: **Unnamed Tributary Stream to West River**

CLASSIFICATION: **Class B - Warm Water Fishery** (Blackstone River Watershed)

I. PROPOSED ACTION, TYPE OF FACILITY, AND DISCHARGE LOCATION

The applicant applied to the U.S. Environmental Protection Agency (EPA)on February 10, 2005 for re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water. The current permit expired on September 30, 2005 and remains in effect. This draft permit will expire five (5) years after the effective date.

The facility is engaged in the collection and treatment of municipal wastewater. The discharge is from an advanced wastewater treatment plant and the effluent is discharged to an unnamed stream that is a tributary of the West River.

II. DESCRIPTION OF THE DISCHARGE

A quantitative description of the wastewater treatment plant discharge in terms of significant effluent parameters based on recent monitoring data is shown on attached **Tables Two, Three and Four** of this fact sheet.

III. LIMITATIONS AND CONDITIONS

The effluent limitations and monitoring requirements may be found in the draft NPDES permit.

IV. PERMIT BASIS AND EXPLANATION OF EFFLUENT LIMITATION DERIVATION

A. PROCESS DESCRIPTION

The Upton Wastewater Treatment Plant (WWTP) is a 0.4 MGD municipal advanced wastewater treatment facility which discharges to an unnamed tributary of the West River. Wastewater treatment processes consist of aeration, secondary settling, phosphorus removal, sand filtration, chlorine contact and sodium bisulfite dechlorination. The sludge from this facility is transported by a licenced hauler to an incineration facility. The Upton WWTP does not currently serve any industrial users, and this facility does not anticipate serving any industrial users during the life of this permit. The facility's location is shown on Figure 1 of this fact sheet.

The Town completed the upgrade of the treatment plant from 0.3 to 0.4 MGD during the term of the current (September, 2002) permit. The current permit authorized the increased discharge subject to more stringent effluent limits, to ensure that discharge did not degrade water quality (the previous permit, issued in September 1995 authorized a discharge flow of 0.3 MGD). The draft permit limits are also based on a design flow of 0.4 MGD. Table One provides a comparison of the effluent limits in the 1995, 2002, and draft 2005 permits.

TABLE ONE: Effluent Limits of 1995, 2002, and Draft 2005 Permits

POLLUTANT	1995 PERMIT	2002 PERMIT	DRAFT PERMIT
Flow (MGD)	0.3	0.4	0.4
BOD & TSS (mg/l) (May 1 - Oct 31)	15- monthly ave 25- weekly ave	12- monthly ave 20- weekly ave	12 - monthly ave 20 - weekly ave
BOD & TSS (lbs/day) (May 1 - Oct 31)	38- monthly ave* 63- weekly ave*	38- monthly ave 63- weekly ave	38- monthly ave 63- weekly ave
BOD and TSS (mg/l) (Nov 1 - Apr 30)	30- monthly ave 45- weekly ave	22- monthly ave 34- weekly ave	22- monthly ave 34- weekly ave
BOD and TSS (lbs/day) (Nov 1-Apr 30)	75- monthly ave* 113- weekly ave*	75- monthly ave 113- weekly ave	75- monthly ave 113- weekly ave
Chlorine Residual (ug/l)	23 - monthly ave 40 - maximum day	11.2 - monthly ave 19.4 - maximum day	11.2 - monthly ave 19.4 - maximum day
Ammonia- N (mg/l) (May 1- Oct 31)	3.0 - monthly ave	2.3 - monthly ave	2.3 - monthly ave
Ammonia- N (mg/l)	No Limit	7.0 - monthly ave	7.0 - monthly ave

POLLUTANT	1995 PERMIT	2002 PERMIT	DRAFT PERMIT
Total P (mg/l) (May 1- Oct 31)	1.0 maximum day	0.2 - monthly ave	0.2 - monthly ave (April 1 - Oct 31)
Total P (mg/l) (Nov 1 - Apr 30)	No Limit	No Limit	1.0 - monthly ave (Nov 1 - Mar 31)
Total Al (ug/l)	No Limit	88.7 - monthly ave 765 - max day	88.7 - monthly ave 765 - max day
Total Cd (ug/l)	No Limit	0.19 - monthly ave 1.5 - max day	1.3 - monthly ave 8.5 - max day
Total Cu (ug/l)	7.5 - monthly ave 10.0 - max day	6.0 - monthly ave 8.6 - max day	6.0 - monthly ave 8.6 - max day
Total Pb (ug/l)	1.1 - monthly ave 29 - maximum day	1.62 - monthly ave	1.62 - monthly ave
Total Zn (ug/l)	No Limit	77 - monthly ave 77 - max day	77 - monthly ave 77 - max day
NOEC (%)	48	98	98

* Mass was not limited in 1995 permit, these values were calculated using permitted concentration limits and the flow limit of 0.3 MGD.

B. OUTFALL 001 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Overview of Federal and State Regulations

Secondary treatment technology guidelines (effluent limits), which represent the minimum level of control for Publicly Owned Treatment Works, can be found at 40 CFR Part 133. Since all Clean Water Act statutory deadlines for meeting technology-based guidelines (effluent limits) have expired, the deadline for compliance with technology-based effluent limits for a Publicly Owned Treatment Works is the date of permit issuance (See also: 40 CFR §125.3(a)(1)). Extended compliance deadlines cannot be authorized by a NPDES permit, if the statutory deadlines have passed.

Section 301(b)(1)(C) of the Clean Water Act requires water quality-based limits in NPDES permits when EPA and the State determine that effluent limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water-quality. Receiving water requirements are established according to numerical and narrative standards adopted under state law. A water quality standard consists of three elements: (1) beneficial designated use(s) for a water body or segment of a water body; (2) a numeric or narrative water quality criteria sufficient to protect the designated use(s); and (3) an anti-degradation requirement to ensure that once a use is attained, it will be maintained.

Pursuant to 40 CFR § 122.44 (d), permittees must achieve water quality standards established under Section 303 of the CWA, including state narrative criteria for water quality. Additionally, under 40

CFR § 122.44 (d)(1)(i), "Limitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard." When determining whether a discharge causes, or has the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numeric criterion, the permitting authority will use procedures which account for existing controls on point and non-point sources of pollution, and where appropriate, consider the dilution of the effluent in the receiving water.

A permit may not be renewed, reissued, or modified with less stringent limitations or conditions than those contained in the previous permit unless the limitations or conditions are in compliance with the anti-backsliding requirement of the Clean Water Act. EPA's anti-backsliding provisions found under 40 CFR Part 122.44(l) restrict the relaxation of permit limits, standards, and conditions. Effluent permit limits based on Best Professional Judgement (BPJ), water quality standards, and state certification requirements must also meet the anti-backsliding provisions found under Section 402(o) and 303(d)(4) of the Clean Water Act, as described under 40 CFR Part 122.44(l).

2. Water Quality Standards; Designated Use; Outfall 001

The Upton Wastewater Treatment Plant (WWTP) discharges into an unnamed tributary of the West River. The West River is a major tributary of the Blackstone River. It flows south from Grafton, MA through Upton, MA and Northbridge, MA and joins the Blackstone River in Uxbridge, MA. The Blackstone River then joins the Seekonk River in Pawtucket, Rhode Island. The unnamed tributary of the West River, and the West River are a part of the Blackstone River Basin and the Narragansett Bay Basin.

The unnamed tributary is classified as a Class B warm water fishery by the Massachusetts Department of Environmental Protection (MADEP) in the Massachusetts Surface Water Quality Standards, 314 Code of Massachusetts Regulations ("CMR") 4.05(4)(a). The Massachusetts Surface Water Quality Standards (SWQS) describes Class B waters as having the following uses: (1) a habitat for fish, other aquatic life, and wildlife, (2) primary and secondary contact recreation, (3) a source of public water supply (i.e., where designated and with appropriate treatment), (4) suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses, and (5) will have consistently good aesthetic value.

The SWQS (314 CMR 4.02) define warm water fisheries as waters in which the maximum mean monthly temperature generally exceeds 20° Celsius during the summer months and are not capable of supporting a year-round population of cold water stenothermal aquatic life.

A comprehensive assessment program of the Blackstone River Watershed began in 1991, under a cooperative agreement with the EPA, MADEP, Rhode Island Department of Environmental Management (RIDEM), and the University of Rhode Island. This assessment program was part of the Blackstone River Initiative (BRI). The BRI included an extensive water quality survey of the Blackstone River and its tributaries, and was conducted during 1991-1994 by the MADEP. The survey included both dry and wet weather sampling, as well as sediment quality, biological and habitat assessment (Wright et al. 2001). Twenty three water quality stations were selected for analysis, including stations located along the mainstem of the river, six major tributaries, and near the discharge locations of the two largest point sources (Upper Blackstone Water Pollution Abatement District and Woonsocket WWTF) within the watershed.

Impaired water quality conditions persist in the West River and have resulted in its listing on the *Massachusetts Year 2002 Integrated List of Waters* (MADEP 2003), formerly referred to as the 303(d) list. Also, the West River is currently listed on the proposed 2004 list. Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those waterbodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDL). The West River appears in Category 5 of the integrated list for waters requiring a TMDL. Water quality impairments in the West River are attributed to metals, nutrients, pH, organic enrichment/low dissolved oxygen, and salinity/TDS/chlorides (MADEP 2004).

Also, West River Pond, a 37 acre pond located on the West River in Uxbridge, MA, downstream of the Upton WWTF, is a widely used recreational pond which has noted impairment caused by noxious plants and exotic species (MADEP 2004). West River Pond is also on the state's 2002 and proposed 2004 303(d) lists of impaired waters.

3. 7Q10 Flow

The 7Q10 is the lowest observed mean river flow for 7 consecutive days recorded over a 10-year recurrence interval. For rivers and streams, Title 314 CMR 4.03(3)(a) requires that 7Q10 be used to represent the critical hydrologic condition at which water quality criteria must be met.

A 7Q10 flow of 0.01cfs (0.006 MGD) was calculated based on 7Q10 characteristics, drainage area, and period of record for low-flow partial-record station located near Pleasant Street on the West River at Weston Upton, MA (USGS 1984). The drainage area at the point of discharge into the unnamed tributary was determined to be 0.36 square miles (mi^2).

Area

Drainage Area at point of discharge into the unnamed tributary = 0.36 mi^2

Flows:

West River; West Upton near Pleasant Street (USGS gage 01111150)

Drainage area = 14.7 mi^2

7Q10 = 0.5 cfs.

Calculation:

7Q10 at site point of discharge = 0.5/14.7.0 X 0.36 = 0.01cfs

Available Dilution

Water quality based limitations are established with the use of a calculated available dilution. The facility design flow is 0.4 million gallons per day (MGD). The 7Q10 flow at the point of discharge is 0.01 cfs (0.006 MGD), as noted in the previous permit. Based on this information, the dilution factor is 1.02;

River flow (7Q10) + Plant Design Flow = Dilution Factor

Plant Design Flow

0.006 MGD + 0.4 MGD = 1.015 (rounded to 1.02)

0.4 MGD

4. OUTFALL 001 - CONVENTIONAL POLLUTANTS:

Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) - Section 301(b)(1)(B) of the CWA requires publicly owned treatment works (POTWs) to have achieved effluent limitations based upon **secondary treatment** by July 1, 1977. The secondary treatment requirements are set forth at 40 CFR Part 133, and include monthly average and weekly average concentration limitations on BOD and TSS as well as monthly average percent removal limitations on BOD and TSS. The monthly average percent removal limits for BOD_5 and TSS of 85 percent or greater are included in the draft permit. The BOD and TSS concentration limits in the draft permit are more stringent than required by the secondary treatment requirements.

The cold weather (November 1- April 30) concentration limits in the draft permit are the same as the limits in the current permit. The current permit limits were made more stringent than the previous (September 1995) permit limits in order to maintain the same mass loading of BOD and TSS at the increased flow limit of 0.4 MGD. Specifically, the authorized mass loadings at the previous design flow of 0.3 were calculated, and then lower concentration limits were back- calculated using the increased design flow of 0.4 MGD. The mass limits are the same as in the current permit and were calculated using the concentration limits and the flow limit of 0.4 MGD.

The warm weather (May 1 - October 31) concentration limits are the same as in the current permit. Similar to the cold weather limits, the water quality- based warm weather concentration limits were made more stringent in the current permit than in the previous permit in order to maintain the same mass loading of BOD and TSS at the increased flow limit of 0.4 MGD. The mass limits are the same as in the current permit and were calculated using the concentration limits and the flow limit of 0.4 MGD.

There have been no violations of BOD_5 or TSS monthly average concentration limits during the period of January 2003 through April 2005, with a long term average of 3.6 mg/l and 3.2 mg/l, respectively. Similarly, there have been no violations of the weekly average concentration limits of BOD_5 and TSS, with a long term weekly average of 5.5 mg/l and 5.0 mg/l, respectively. Maximum daily concentrations averaged 7.6 mg/l and 8.6 mg/l for BOD_5 and TSS, respectively. The BOD_5 and TSS removal percentages have both averaged 98 % and 99 %, respectively with no violations during this same time period (See Table One for details).

pH - The draft permit includes pH limitations which are required by Massachusetts Surface Water Quality Standards 314 CMR, and are at least as stringent as pH limitations set forth at 40 C.F.R. §133.102(c). Class B waters shall be in a range of 6.5 through 8.3 standard units and not more than 0.5 standard units outside of the normally occurring range [314 CMR 4.0 (4)(a)3]. There shall be no change from background conditions that would impair any use assigned to this class. The monitoring frequency is once (1) per day.

Fecal Coliform Bacteria - The draft permit includes seasonal fecal coliform bacteria limitations, which are in accordance with the Massachusetts Surface Water Quality Standards 314 CMR 4.05 (4)(b). The proposed limits in the draft permit are a geometric mean of no more than 200 colony forming units (cfu)/100 ml for the average monthly limit and shall not exceed a daily maximum of 400 colony forming units (cfu)/100 ml for the maximum daily limit. These limits are consistent with Class B surface water quality requirements of the MADEP. Monitoring will occur April 1 to October 31 and is maintained as one (1) sample per week.

As noted on page 3 of the permit, a routine sampling program shall be developed in which samples are taken at the same location, same time and same day(s) of every month. Any deviations from the routine sampling program shall be documented in correspondence appended to the applicable discharge monitoring report that is submitted to EPA.

5. OUTFALL 001 - NON-CONVENTIONAL POLLUTANTS

Nutrients: Ammonia-Nitrogen, Nitrogen and Phosphorus

Nutrients are compounds containing nitrogen and phosphorus. Although nitrogen and phosphorus are essential for plant growth, high concentrations of these nutrients can cause eutrophication, a condition in which aquatic plant and algal growth is excessive. Plant and algae respiration and decomposition reduces dissolved oxygen concentrations in the water, creating poor habitat for fish and other aquatic animals. In addition, nitrogen in the form of ammonia can be toxic to aquatic life. The toxicity level of ammonia depends on the temperature and pH of the receiving water (USEPA 1999).

Ammonia-Nitrogen - The draft permit continues the current permit's warm weather (May 1 through October 31) average monthly concentration limit for ammonia-nitrogen; 2.3 mg/l. The limit in the current (2002) permit was calculated using the ammonia nitrogen loading authorized by the previous (1995) permit using that permit's concentration limit of 3.0 mg/l and the pre-upgrade design flow of 0.3 MGD, and then back-calculating the concentration limit for the upgraded plant using the new design flow of 0.4 MGD. This limit is continued to ensure that receiving water quality is maintained. Biological decomposition of ammonia-nitrogen uses dissolved oxygen, and if the mass discharge were increased in the warm weather months this could result in lowering of instream concentrations of dissolved oxygen. Based on the USEPA (1999) ammonia guidance document, an instream ammonia criteria of 3.21 mg/l at a pH of 7 and temperature of 24 ^{0}C (75 ^{0}F) is recommended if early life states of sensitive vertebrate species are present.

Ammonia-Nitrogen data was reviewed from sampling analyses submitted with the monthly DMRs from January 2003 through April 2005 (see Table Four). The median value for the warm weather monthly average concentration was 0.25 mg/l (n = 16). Monthly average ammonia-nitrogen values for the warm weather (May through October) ranged between 0.02 mg/l to 7.0 mg/l (n=12).

The cold weather limits in the draft permit are also carried over from the current permit, which were established in accordance with the USEPA (1999) ammonia guidance document and a dilution factor of 1.13, based on a receiving water winter 30Q10 flow. The guidance recommends an instream ammonia criteria of 5.91 mg/l at a pH of 7 and a temperature of 10 ^{0}C , if early life stages of sensitive vertebrate species are present.

The median value for the cold weather average monthly concentration was 4 mg/l. Monthly average ammonia-nitrogen values for the cold weather (November through April) ranged between 0.21 mg/l - 16.7 mg/l (n=16). See Table Four.

Ammonia-Nitrogen sample limitations during the cold weather:

West River, at the West Hill Dam gage station, Uxbridge, MA:

7Q10 flow = 0.2 cfs = (0.2 cfs x 0.646272 MGD/cfs) = 0.13 MGD (Annual flow)

30Q10 flow = 3.33 cfs = (3.33 x 0.646272 MGD/cfs) = 2.15 MGD (October - April)

Drainage Area = 27.8 square miles

Unnamed Stream, at the Point of Discharge, Upton, MA:

7Q10 flow = 0.01 cfs = (0.005 cfs x 0.646272 MGD/cfs) = 0.006 MGD (Annual flow)

30Q10 flow = 0.08 cfs = (0.051 cfs x 0.646272 MGD/cfs) = 0.051 MGD (October - April)

Drainage Area = 0.36 square miles

30Q10 dilution factor (winter)=(Unnamed Tributary 30Q10 + plant design flow) / plant design flow

(0.051 + 0.4) / 0.4= 1.13

Ammonia-Nitrogen Cold weather Limit:

Critical instream temperature = 10 ^{0}C (winter instream temperature)

Critical instream pH = 7.0 (winter instream pH)

Chronic Ammonia Criteria (Chronic Criterion for Early Life Stages Present) = 5.91

Therefore, the Ammonia-Nitrogen winter limit:

(30Q10 winter dilution factor x instream ammonia criteria)

(1.13 x 5.91) = 6.7 mg/l (A cold weather limit of 7.0 mg/l is proposed for the draft permit.)

Potential Future Ammonia Criteria - Additionally, EPA has recently noticed its intention to re-evaluate the current aquatic life ambient water quality criteria for ammonia to determine whether it should be revised based on new toxicity data for aquatic organisms (USEPA 2004). If future ammonia criteria demonstrate that more stringent ammonia limits are needed to meet water quality standards, this permit may be re-opened and modified.

Nitrogen - It has been determined that excessive nitrogen loadings are causing significant water quality problems in Narragansett Bay (Nixon 1998, Nixon et al. 2005, RIDEM 2005). Analyses of the Narragensett Bay conditions indicates the largest source of nitrogen to the Bay are WWTFs (RIDEM 2005). In response, the State of Rhode Island has begun to impose nitrogen limitations on Rhode Island discharges to Narragansett Bay and its tributaries. Rhode Island DEM has expressed their interest in collaborating with MADEP and EPA to pursue nitrogen reductions at the Upper Blackstone Wastewater Abatement District, North Attleborough WWTF and the Attleborough WWTF (RIDEM 2005). Also, based on an annual estimate of nitrogen flux into the Bay from rivers, the Blackstone River was estimated to be the largest contributor of nitrogen. Of the river nitrogen contributions, the

Blackstone River contributes 53% nitrogen, and 45% phosphorus. Thus, EPA believes there is a need to determine the loadings of nitrogen from sources in Massachusetts which are tributary to the Blackstone River. An understanding of nitrogen loadings from Massachusetts sources will help to determine whether these loadings are impacting the water quality in Narragansett Bay. Ultimately, an understanding of nitrogen loadings from Massachusetts will help determine if nitrogen limits are necessary for discharges in Massachusetts. Therefore, along with the ammonia-nitrogen limits mentioned above, EPA has included monitoring requirements for nitrite, nitrate, and Kjeldahl nitrogen in the draft permit. The information submitted by the permittee will help to establish a database of nitrogen loadings, which can be used to quantitatively assess the impact of loading and transport of nitrogen to Narragansett Bay. The monitoring data will provide a more sound decision making basis in the future decisions relating to nitrogen loadings to Narragansett Bay.

Phosphorus - EPA has produced several guidance documents which contain recommended total phosphorus criteria for receiving waters. The 1986 Quality Criteria of Water ("the Gold Book") recommends in-stream phosphorus concentrations of 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impoundments (i.e., free flowing), and 0.025 mg/l within the lake or reservoir.

In December 2000, EPA released "Ecoregional Nutrient Criteria," (USEPA 2000) established as part of an effort to reduce problems associated with excess nutrients in water bodies located within specific areas of the country. The published criteria represent conditions in waters within each specific ecoregion which are minimally impacted by human activities, and thus are representative of waters without cultural eutrophication. Upton is within Ecoregion XIV, Eastern Coastal Plains (level III ecoregion 59). The recommended total phosphorus criteria for Ecoregion XIV is 24 ug/l (0.024 mg/l) and can be found in the *Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV*, (see reference list for complete publication details).

More recently, Mitchell, Liebman, Ramseyer, and Card (in draft 2004), in conjunction with the New England States, developed potential nutrient criteria for rivers and streams in New England. Using several river examples representative of typical conditions for New England streams and rivers, they investigated several approaches for the development of river and stream nutrient criteria that would be dually protective of designated uses in both upstream reaches and downstream impoundments. Based on this investigation an instream total phosphorus concentration of 0.020 - 0.022 mg/l was identified as protective of designated uses for New England rivers and streams. The development of this New England-wide total phosphorus concentration was based on more recent data than the National Ecoregional nutrient criteria, and have been subject to quality assurance measures. Additionally, the development of the New England-wide concentration included reference conditions for waters presumed to be protective of designated uses.

Currently, the Massachusetts Surface Water Quality Standards (314 CMR 4.00) do not contain numeric criteria for total phosphorus. The narrative criteria for nutrients is found at 314 CMR 4.05(5)(c), which states that nutrients "shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication." The Water Quality Standards also require that "any existing point source discharges containing nutrients in concentrations which encourage eutrophication or the growth of weeds or algae shall be provided with the highest and best practicable treatment (HBPT) to remove such nutrients (314 CMR 4.04). MADEP has established that a monthly average total phosphorus limit of 0.2 mg/l represents highest and best practical treatment for POTWs.

Sampling on the West River

Water quality sampling was conducted for the West River on September 20, 1998 as part of the Blackstone River basin assessment (MADEP 2001). Three stations were sampled for total

phosphorus concentration on the West River and one on Center Brook. For reference, the Upton WWTF is located at approximately river mile 9. As follows:

Station	River Mile	Total Phosphorus (mg/l)
WR12	10	0.04
WR10[1]	8.6	0.19
WR03	3.3	0.06
WR20 [2]	1.6	0.02

[1] WR10 is located 0.4 miles downstream of the WWTF in a wetland

[2] Station located on Center Brook, tributary of West River

Total phosphorus measurements are above the recommended total phosphorus criteria for Ecoregion XIV (24 ug/l or 0.024 mg/l) and the New England-wide concentration (0.020 - 0.022 mg/l) for all stations, barring Station WR20, located on Center Brook. The Gold Book recommended criterion for free flowing streams is met at stations WR12 and WR03. The total phosphorus concentration at the upstream station, WR12, is lower than both downstream stations on the West River, WR10 and WR03. All stations meet the Gold Book recommended criteria for free-flowing streams, barring WR10. The remaining recommended Gold Book criteria are met for some stations.

Comparing data from the Center Brook station, WR20, to the stations on West River, it is apparent that phosphorus levels are elevated in the West River, especially in the downstream stations. Although it is recognized that Station WR10 is located in a wetland 0.4 miles downstream of the Upton WWTF, and that a wetland may inherently have a higher phosphorus level, it is equally recognized that wetlands serve as sinks for phosphorus inputs (Craft 1997 in USEPA 2002). Therefore, the downstream wetland could have higher levels of phosphorus than would be expected given the presence of the Upton WWTF's discharge. USEPA (2002) notes that under conditions of excessive nutrient loadings to wetlands, ecosystem processes, such as plant productivity and nutrient cycling, are altered in measurable ways. Furthermore, it has been demonstrated that a threshold, known as the "assimilative capacity," exists for nutrient inputs to wetlands beyond which significant alteration in wetland function and structure can occur. When the assimilative capacity of a wetland is exceeded, there can be a shift in plant species composition. Changes in community composition and ecosystem processes compromise wetland ecological integrity by altering energy flow, nutrient cycling, and niche/habitat characteristics that in turn affect fauna assemblages (USEPA 2002, Carpenter et al. 1998 in USEPA 2002). Based on a field visit (July 25, 2005), changes in the community composition of a wetland, located downstream of the outfall, were evident given the establishment of a monotypic stand of *Phragmites australis* (common reed).

It is recognized that data presented in the table above were collected after phosphorus removal began at the Upton WWTF in 1995 with a permit limit for total phosphorus of 1.0 mg/l, and that water quality is expected to have improved given the 0.2 mg/l limit in the current permit. However, there remains concern that higher levels of phosphorus discharged during cold weather months continues to accumulate in the downstream wetland, and subsequently be released during the warm weather growing season. Therefore, a cold weather limit for phosphorus has been included in the draft permit.

Total Phosphorus Effluent Sampling: Based on monthly DMR data submitted January 2003 through April 2005, the average maximum daily and monthly average total phosphorus concentration ranged between 0.04 mg/l-0.49 mg/l (n=28) and 0.03 and 3.3 mg/l (n=28), respectively (see Table 4). Assuming zero background concentration of total phosphorus, and given the plant design flow of 0.4 MGD and 7Q10 of 0.006 MGD, the application of the mass balance equation indicates that instream concentration of total phosphorus would be 0.4828 mg/l; where, (0.49 mg/l)(0.4 MGD)/0.006 MGD + 0.4 MGD = 0.4828 mg/l. This value exceeds the recommended Goldbook, Ecoregional Nutrient Criteria, and New England-wide total phosphorus concentrations.

Phosphorous Permit Limits:

The draft permit proposes to continue the total phosphorus limit of 0.2 mg/l. However, the average monthly summer limit now becomes effective on April 1 each year (changed from May 1) to include all months during which eutrophication typically occurs, and a cold weather limit of 1.0 mg/l (November through March) has been included to address the accumulation of phosphorous in sediments (see below).

This proposed warm weather limit represents the HBPT total phosphorus concentration (0.2 mg/l). Based on narrative and the national and regional criteria, a limit of at least 0.2 mg/l is necessary to meet water quality standards. A lower limit may be required upon completion of a future TMDL, or an updated water quality analysis, including a better understanding of the reductions in upstream concentrations that may be achievable. Therefore, this permit may be re-opened and modified to account for a more stringent limit or new state criteria.

The proposed cold weather limit (November 1 through March 31) is 1.0 mg/l. The cold weather limitation on phosphorus is necessary to ensure that the higher levels of phosphorus discharged during the cold weather months do not result in the accumulation of phosphorus in the sediments, and subsequent release during the warm weather growing season. The limitation assumes that the dissolved fraction of the total phosphorus will pass through the system given the short detention time of the impoundments and the lack of plant growth during cold weather months (USEPA-Region One 2005). A monitoring requirement for orthophosphorus has been included for the cold weather months in order to determine the particulate fraction.

The draft permit includes an average monthly limit for total phosphorus of 0.2 mg/l to reduce the instream impairment in the unnamed stream and the West River. An abundance of aquatic vegetation, low dissolved oxygen and percent saturation conditions have been noted in the West River downstream from the Upton WWTP. An abundance of aquatic vegetation has been noted in the unnamed stream. Instream dissolved oxygen sampling was conducted during the Blackstone River Initiative. The dissolved oxygen concentration in the West River less than half a mile downstream from the Upton WWTP discharge, in a large wetland, was 4.1 mg/l and the saturation was 45%. The dissolved oxygen concentration was 7.7 mg/l and 85% saturation at a monitoring station approximately four and half miles further downstream. The State water quality standards [314 CMR 4.04 (5)] require any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment (0.2 mg/l total phosphorus) to remove such nutrients. Phosphorus interferes with water uses and reduces instream dissolved oxygen. A phosphorus limit in the permit is required to prevent eutrophic conditions in the unnamed stream, the West River, and the West River Pond. This pond is located further downstream of the discharge in Uxbridge, MA on the West River. It is a widely used recreational pond, which has noted impairment caused by noxious plants and non-native plants (MADEP 2004).

OUTFALL 001 - TOXIC POLLUTANTS

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is, or may be discharged at a level that causes, or has "reasonable potential" to cause or contribute to an excursion above any water quality criterion. An excursion occurs if the projected or actual in stream concentration exceeds the applicable criterion.

In determining reasonable potential, EPA considers: (1) existing controls on point and non-point sources of pollution; (2) pollutant concentration and variability in the effluent and receiving water as determined from permit's reissue application, Monthly Discharge Monitoring Reports (DMRs), and State and Federal Water Quality Reports; (3) sensitivity of the species to toxicity testing; (4) statistical approach outlined in *Technical Support Document for Water Quality-based Toxics Controls,* (USEPA 1991) in Section 3; and, where appropriate, (5) dilution of the effluent in the receiving water.

EPA is required to limit any pollutant or pollutant parameter that is or may be discharged at a level that caused, has reasonable potential to cause or contributes to an excursion above any water quality criterion.

Total Residual Chlorine (TRC) - Chlorine and chlorine compounds produced by the chlorination of wastewater can be extremely toxic to aquatic life. Effluent limits are based water quality criteria for total residual chlorine (TRC) which are specified in the water quality criteria document, often referred to as the EPA Gold Book (USEPA 1986). The criteria states that the average TRC in the receiving water should not exceed 11 ug/l for protection from chronic toxicity and the maximum TRC should not exceed 19 ug/l to protect fresh water aquatic life from acute toxicity.

Total Residual Chlorine DMR data from January 2003 through April 2005 ranged between 7 ug/l - 27 ug/l for monthly average values, and between 10 ug/l and 40 ug/l for maximum daily values (n = 28). The average values for monthly average and maximum daily were 14.0 ug/l and 22 ug/l, respectively (n = 28). See Table One.

Thus, there is reasonable potential for TRC concentrations discharged in the effluent to cause or contribute to an exceedance of the water quality criteria given that effluent concentrations are above the criteria. Thus, pursuant to 40 CFR § 122.44(d)(1)(iii), the draft permit includes an average monthly limitation of 11.2 ug/l and maximum daily limitation of 19.4 ug/l for TRC effluent limits. The limits are calculated below.

Also, the draft permit requires that individual TRC daily results (three per day) will be reported and include the 1) individual sample result, 2) time at which the sample was taken, and 3) sampling date. The information for each sample will be reported in an attachment to the monthly DMRs. It should be noted that the draft permit requires that a routine sampling program be developed in which samples are taken at the same location, same time and same day(s) of every month. Any deviations from the routine sampling program shall be documented in correspondence appended to the applicable discharge monitoring report that is submitted to EPA.

TRC Limit Calculation:

The 7Q10 dilution and plant design flow are necessary to calculate the appropriate TRC limits. The 7Q10 dilution multiplied by the acute and chronic fresh water criteria provide the appropriate TRC limits. As shown below, the calculated limits are 0.045 mg/l and 0.078 mg/l.

Given:

acute freshwater criteria	19 ug/l (0.019 mg/l) chlorine
chronic freshwater criteria	11 ug/l (0.011 mg/l) chlorine

dilution factor 1.02

Then:

(acute criteria)(dilution factor) = Daily Maximum Limit

(19 ug/l)(1.02) = 19.38 ug/l (0.019 mg/l)

(chronic criteria) (dilution factor) = Monthly Average Limit

(11 ug/l)(1.02) = 11.22 ug/l (0.011 mg/l)

The draft permit includes a requirement that chlorination and dechlorination systems provide an alarm for indicating system interruptions or malfunctions. Any interruption or malfunction of the chlorine dosing system may result in levels of chlorine that are inadequate for achieving effective disinfection, or interruptions and/or malfunctions of the dechlorination system may result in excessive levels of chlorine in the final effluent. The draft permit requires that all interruptions or malfunctions be reported with the monthly DMRs. The draft permit requires that the report include the date and time of the interruption or malfunction, the nature of the problem, and the estimated amount of time that the reduced levels of chlorine or dechlorination chemicals occurred.

Metals: Aluminum, Cadmium, Copper, Lead, and Zinc

Certain metals in water can be toxic to aquatic life. There is a need to limit toxic metal concentrations where the discharge has the reasonable potential to cause or contribute to an exceedance of water quality standards. The current permit includes effluent limitations for Aluminum, Cadmium, Copper, and Lead. The monitoring data for each metal, a reasonable potential analysis, and the basis for the effluent limitations are discussed below.

Aluminum - The National Recommended Water Quality Criteria for aluminum are 87 ug/l (CCC) and 750 ug/l (CMC). Using the dilution factor of 1.02, effluent limits can be calculated as follows:

CMC = 750 ug/l (National Recommended Water Quality Criteria: 2002)

CCC = 87 ug/l (National Recommended Water Quality Criteria: 2002)

Dilution Factor (DF) = 1.02

CMC * DF = acute aluminum limit

750 ug/l * 1.02 = 765 ug/l

CCC * DF = chronic aluminum limit

87 ug/l * 1.02 = 88.7 ug/l

Aluminum data submitted from January 2003 and April 2005 on the monthly DMRs (see Table Two) shows that monthly average aluminum values ranged between 80 ug/l and 390 ug/l (n=28), and maximum daily values ranged between 110 ug/l and 390 ug/l (n=28) (see Table Two). The average monthly and maximum daily values were 166 ug/l and 212 ug/l, respectively (n = 28).

The data shows that the monthly average limits have been exceeded. The discharge of aluminum clearly has reasonable potential to cause or contribute to an exceedance of the water quality criteria Thus, pursuant to 40 CFR § 122.44(d)(1)(iii), the draft permit includes a maximum daily limitation of 765 ug/l and an average monthly limitation of 88.7 ug/l.

Hardness-Dependent Metals: Cadmium, Copper, Lead and Zinc

The hardness of the effluent was used to represent instream hardness because during late summer, under 7Q 10 receiving water conditions, the dilution factor may be a low as 1.02, meaning that the receiving water would be about 98% effluent. An average effluent hardness of 58 MG/L was calculated from data submitted with WET tests was used in the current permit. This value is also used in the calculations of limits for the draft permit.

Cadmium -The current permit defines the minimum level (ML) for cadmium as 2 ug/l. However, the laboratory method used to quantify total cadmium applied an ML of 5 ug/l (per. com. Ron San Souci, August 24, 2005). Thus, results reported for total cadmium on the DMRs, which show values less than 5 ug/l do not have a sufficiently low ML to make any meaningful evaluation of compliance with the effluent limit. The draft permit contains the same effluent limitations as the current permit, but requires that an ML of 0.5 ug/l be attained. This lower ML is now considered achievable using the Furnace Atomic Absorption analytical method (EPA Method 220.2) and will provide better data for evaluating compliance with the limit; however because the average monthly limit is lower than the ML, compliance/non-compliance, for this effluent limit will be determined based on the ML. Sample results of less than 0.5 ug/l for the average monthly value will be reported as zero on the DMRs.

Water Quality Criteria for hardness-dependent metals:

Acute criteria (dissolved) = $\exp\{ m_a [\ln(\text{hardness})] + b_a \}$ (CF)

m_a = pollutant specific coefficient

b_a = pollutant specific coefficient

h = hardness

ln = natural logarithm

CF = pollutant specific conversion factor used to convert total recoverable to dissolved metal

Chronic criteria (dissolved) = $\exp\{ m_c [\ln(\text{hardness})] + b_c \}$ (CF)

m_c = pollutant specific coefficient

b_c = pollutant specific coefficient

h = hardness

ln = natural logarithm

CF = pollutant specific conversion factor used to convert total recoverable to dissolved metal

Cadmium - Cadmium limitations were calculated using criteria from *National Recommended Water Quality Criteria:2002* at a hardness 58 mg/l and a dilution factor of 1.02.

Water Quality Criteria for hardness-dependent metals:

Acute criteria (dissolved) = exp{ m_a [ln(hardness)] + b_a } (CF)

Calculation of acute limit for cadmium:

m_a = 1.0166 b_a = -3.924 CF = 1.136672-[(ln hardness)(0.041838) = 0.9668 h = 58

Acute criteria (dissolved) = exp{1.0166 [ln(58)] + -3.924 } (0.9668) = 1.1854

Dilution factor = 1.02

Effluent limitation for dissolved cadmium = 1.1854 ug/l * 1.02 = 1.2091 ug/l

Effluent limitation for total recoverable cadmuim = 1.2091 ug/l/0.960 = 1.2595 ug/l (1.3 ug/l)***

The current permit's acute limit for cadmium is 1.5 ug/l. Due to a minor rounding error in the current permit, this limit is proposed to be changed to 1.3 ug/l.

Calculation of chronic limit for cadmium:

m_c = 0.7409 b_c = -4.719 CF = 1.101672 - [(ln hardness) (0.041838)] = 0.9318 h =58

Chronic criteria (dissolved) = exp {0.7409 [ln (58)] + -4.719} * (0.9318) = 0.1684 ug/l

Dilution factor = 1.02

Effluent limitation for dissolved copper = 0.1684 ug/l * 1.02 = 0.1718 ug/l

Effluent limitation for total recoverable copper = 0.1718ug/l / 0.960 = 0.1790 ug/l (rounded to 0.20)***

Copper - Copper limitations were calculated using criteria from *National Recommended Water Quality Criteria:2002* at a hardness 58 mg/l and a dilution factor of 1.02.

Calculation of acute limit for copper:

m_a = 0.9422 b_a = -1.700 CF = 0.960 h = 58

Acute criteria (dissolved) = exp {0.9422 [ln (58.1)] + -1.700} * (0.960) = 8.04 ug/l

Dilution factor = 1.02

Effluent limitation for dissolved copper = 8.04 ug/l * 1.02 = 8.201 ug/l

Effluent limitation for total recoverable copper = 8.201ug/l/0.960 = 8.54ug/l (rounded to 8.5)***

Calculation of chronic limit for copper:

m_c = 0.8545 b_c = -1.702 CF = 0.960 h =58

Chronic criteria (dissolved) = exp {0.8545 [ln (58)] + -1.702} * (0.960) = 5.62 ug/l

Dilution factor = 1.02

Effluent limitation for dissolved copper = 5.62ug/l * 1.02 = 5.73 ug/l

Effluent limitation for total recoverable copper = 5.73 ug/l / 0.960 = 5.96 ug/l (rounded to 6.0)***

The current acute limit is 8.6 ug/l, and is proposed to be replaced by 8.5 ug/l. This is a minor change based on a rounding error. The chronic limit calculated above is the same as the current permit's, and is included in the draft permit. Average monthly and maximum daily copper concentrations reported on the monthly DMRs (January 2003 to April 2005) ranged between non-detect and 40 ug/l, and non-detect and 43 ug/l, respectively. Monthly average and maximum daily average values were 18.7 ug/l and 20.5 ug/l, respectively (see Table Three). These values exceed the chronic and acute limits calculated above, 6.0 ug/l and 8.5 ug/l, respectively. Thus, it has been determined that a reasonable potential exists for copper, as discharged in the effluent, to cause or contribute to an exceedance of the water quality criteria.

Lead - Review of monthly DMR data for the months of January 2003 to April 2005 (n=28) indicates that all results were below the ML (5 ug/l) for total lead. However, a more recent ML has been established as 3 ug/l for total lead using the Furnace Atomic Absorption analytical method (EPA Method 220.2). This lower ML will provide better data to evaluate compliance with the monthly average limit of 1.62 ug/l, however, because the average monthly limit is lower than the ML, compliance/non-compliance will be determined based on the ML. Sample results of less than 3 ug/l for the average monthly value will be reported as zero on the DMRs.

Calculation of acute limit for lead:

m_a = 1.273 b_a = -1.460 h = 58 CF = 1.46203-[(ln hardness) (0.145712)] = 0.8704

Acute criteria (dissolved) = exp {1.273 [ln (58)] + -1.460} * {1.46203-[(ln hardness)(0.145712)]} = 35.52 ug/l

Dilution factor =1.02

Effluent limitation for dissolved lead = 35.52* 1.02 = 36.23 ug/l

Effluent limitation for total recoverable lead = 36.23 ug/l/0.8704 = 41.62 ug/l or 41.6 ug/l***

Calculation of chronic limit for lead:

m_c = 1.273 b_c = - 4.705 h = 58 CF = 1.46203-[(ln hardness) (0.145712)] = 0.8704

Chronic criteria (dissolved) = exp {1.273 [ln (58)] + - 4.705} * 1.46203-[(58) (0.145712)] = 1.38 ug/l

Dilution factor = 1.02

Effluent limitation for dissolved lead = 1.38 ug/l * 1.02 = 1.41 ug/l

Effluent limitation for total recoverable lead = 1.41ug/l / 0.8704 = 1.62 ug/l, or 1.6 ug/l***

Zinc - Review of monthly DMR data for the months of January 2003 to April 2005 (n=28) shows that there were no exceedances of effluent limitations during this period. Of the 28 months reviewed, 19 reported non-detect values for both monthly average and daily maximum (minimum level of 50 ug/l), 9 months showed monthly average results ranging from 16.6 ug/l to 60 ug/l and maximum day results ranging from 50 ug/l - 60 ug/l. These results show consistent compliance with the effluent limitations of (77 ug/l) (see Table Two). Therefore, the monitoring frequency in the draft permit has been reduced to a quarterly basis. The permittee may report the effluent zinc data generated in conjunction with the WET test to meet this reporting requirement.

Zinc limitations were calculated using criteria from *National Recommended Water Quality Criteria:2002* at a hardness 58 mg/l and a dilution factor of 1.02.

Calculation of acute limit for zinc:

$m_a = 0.8473$ $b_a = 0.884$ CF = 0.978 h = 58

Acute criteria (dissolved) = exp {0.8473 [ln (58)] + 0.884} * (0.978) = 73.86 ug/l

Dilution factor = 1.02

Effluent limitation for dissolved zinc = 73.86 ug/l * 1.02 = 75.34 ug/l

Effluent limitation for total recoverable zinc = 75.34 ug/l/0.978 = 77.03 ug/l, or 77.0 ug/l***

Calculation of chronic limit for zinc:

$m_c = 0.8473$ $b_c = 0.884$ CF = 0.986 h = 58

Chronic criteria (dissolved) = exp{0.8473 [ln (58)] + 0.884} * (0.978) = 73.86 ug/l

Dilution factor = 1.02

Effluent limitation for dissolved zinc = 73.86 ug/l * 1.02 = 73.34 ug/l

Effluent limitation for total recoverable zinc = 73.34 ug/l / 0.986 = 77.03 ug/l, or 77.0 ug/l***

*** The conversion factor is used to determine total recoverable metal. EPA Metal Translator Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion (EPA-823-B96-007) is used as the basis for using the criteria conversion factor. National guidance requires that permit limits be based on total recoverable metals and not dissolved metals. Consequently, it is necessary to apply a translator in order to develop a total recoverable permit limit from a dissolved criteria. The translator reflects how a discharge partitions between the particulate and dissolved phases after mixing with the receiving water. In the absence of site specific data on how a particular discharge partitions in the receiving water, a default assumption is equivalent to the criteria conversion factor used in accordance with the Translator Guidance.

OUTFALL 001 - TOXICS CONTROL

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The Massachusetts State Surface Water Quality Standards include the following

narrative statement and requires that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria:

"All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife."

National studies conducted by the Environmental Protection Agency have demonstrated that domestic sources contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents and aromatic hydrocarbons among others. The Region's current policy is to include toxicity testing requirements in all municipal permits, while Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts.

Based on the potential for toxicity resulting from domestic and industrial contributions, and in accordance with EPA regulation and policy, the draft permit includes acute toxicity limitations and monitoring requirements. (See, e.g., "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants", 50 Fed. Reg. 30,784 (July 24, 1985); see also, EPA's Technical Support Document for Water Quality-Based Toxics Control and MA DEP's Implementation Policy for the Control of Toxic Pollutants in Surface Waters. EPA Region I and MA DEP have developed toxicity control policies. The policies requires wastewater treatment facilities to perform toxicity bioassays on their effluents. The Commonwealth of MA DEP requires bioassay toxicity testing for state certification.

The MA DEP, in its "Implementation Policy for the Control of Toxic Pollutants in Surface Waters" (February 23, 1990) sets forth toxicity limits which have been adopted by EPA Region I. This document assigns effluent toxicity limits according to dilution factors based on perceived risk. The DEP prefers the use of acute toxicity tests in permits which may be measured with an LC50, or the concentration that is lethal to 50% of the test organisms. This value may also be expressed as a toxic unit (TU) which is defined as 100 divided by the LC50. Thus, an LC50 of 100% would equal 1.0 TU. The DEP prefers to use acute toxicity limits, based on dilution available to the effluent, and its recommended criterion to prevent acutely toxic effects is 0.3 TU. This value is based on an adjustment factor of one-third used to extrapolate the LC50 to an LC1, the concentration at which 1% of the test organisms die. In order to assure that the limit is met within a short distance of the effluent pipe, the DEP has recommended an end of pipe limit of 1.0 TU (LC50 = 100%) for dilution factors 100 or below and 2.0 TU (LC50 = 50%) for dilution factors above 100. Therefore, an LC50 limit of 100% has been maintained in this permit. Pursuant to MA DEP and EPA Region 1 policy, discharges having a dilution of less than 10:1 also require chronic toxicity testing four times per year. A chronic NOEC limit of 98% or greater has also been maintained in this permit along with the LC50 limit. This value is derived by taking the inverse of the receiving water concentration (dilution) of 1.02 As follows;

Chronic NOEC Limit Calculation

$$\frac{1.0}{1.02} * 100 = 98\%$$

The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analyses; (2) bioavailability of pollutants after discharge is best measured by toxicity testing including any synergistic effects of pollutants; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in conjunction with pollutant specific control procedures to control the discharge of toxic pollutants.

The proposed draft permit continues the current permit requirement for Acute and Chronic toxicity tests using the daphnid, Ceriodaphnia dubia and the fathead minnow, Pimephales promelas. The toxicity tests must be performed in accordance with the test procedures and protocols specified in **Attachment A** of the permit. The permittee may request a reduction in the toxicity testing requirements if there are four consecutive passing toxicity test results. The permittee will continue conducting toxicity testing in accordance with the permit until notice is received by certified mail from the EPA that the toxicity testing requirements have been changed.

OUTFALL 001 - NUMERIC EFFLUENT LIMITATIONS FOR TOXICANTS

EPA and the MADEP may use the results of the monthly toxicity tests and chemical analyses conducted by the permittee, required by the permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numeric effluent limitations for any pollutants.

V. ANTI-DEGRADATION REVIEW

The antidegradation provisions in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00, require the protection of existing uses and the level of water quality necessary to sustain these uses. Section 4.04 of the Massachusetts Water Quality Standards requires that: (1) in all cases, existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected; and (2) certain waters, including low flow waters whose character cannot be adequately described or protected by the traditional criteria, shall be designated for protection under 314 CMR 4.06(2) and 4.06(3). These waters will be protected and maintained for their existing level of quality unless limited degradation by a new or increased discharge is authorized by the Massachusetts Department of Environmental Protection, Division of Watershed Management. The antidegradation provisions at 314 CMR 4.04(2) allow limited degradation by a new or increased discharge, as long as it is authorized by the MADEP. Limited degradation of a high quality water is allowed under either of two circumstances: (1) the discharge is insignificant because it does not have the potential to impair uses and cause any significant lowering of water quality, or (2) the discharge qualifies for an authorization (called a variance prior to regulatory revisions promulgated in 1996) based on necessity, evaluation of alternatives, minimization of adverse impacts, and maintenance of uses and the water quality classification.

VI. SLUDGE CONDITIONS

Section 405(d) of the CWA requires that EPA develop technical standards regarding the use and disposal of sewage sludge. On February 19, 1993, EPA promulgated technical standards. These standards are to be implemented through permits. The conditions in the permit satisfy this requirement.

VII. INDUSTRIAL USERS

The permittee is required to identify, in terms of character and volume of pollutants, and report to EPA any significant indirect dischargers into the POTW subject to pretreatment standards under Section 307(b) of the CWA and 40 CFR Part 403.

VIII. MONITORING AND REPORTING

The permittee is obligated to monitor and report sampling results to EPA and the MADEP within the time specified within the permit. Timely reporting is essential for the regulatory agencies to expeditiously assess compliance with permit conditions.

IX. ESSENTIAL FISH HABITAT DETERMINATION (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The unnamed stream and the West River are not covered by the EFH designation for riverine systems and thus EPA have determined that a formal EFH consultation with NMFS is not required.

X. ENDANGERED SPECIES ACT

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species, where as the National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

As the federal agency charged with authorizing the discharge from this facility, EPA consulted with the USFWS as required under section 7 (a)(2) of the Endangered Species Act (ESA), for potential impacts to federally listed species. Based on a letter received from the USFWS (July 11, 2005), it is EPA's understanding that no federally-listed or proposed, threatened or endangered species or critical habitat, under the jurisdiction of the US Fish and Wildlife Service, are known to occur in the West River or vicinity of the Upton WWTF. Furthermore, the effluent limitations and other permit requirements identified in this Fact Sheet are designed to be protective of all aquatic species.

XI. STATE PERMIT CONDITIONS

The NPDES Permit is issued jointly by the U. S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under federal and state law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection pursuant to M.G.L. Chap. 21, §43.

XII. GENERAL CONDITIONS

The general conditions of the permit are based on 40 CFR Parts 122, Subparts A and D and 40 CFR § 124, Subparts A, D, E, and F and are consistent with management requirements common to other permits.

XIV. STATE CERTIFICATION REQUIREMENTS

The staff of the MADEP has reviewed the draft permit. EPA has requested permit certification by the State pursuant to 40 CFR § 124.53 and expects that the draft permit will be certified.

XV. PUBLIC COMMENT PERIOD AND PROCEDURES FOR FINAL DECISION

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Office of Ecosystem Protection, NPDES Unit, One Congress Street, Suite-1100, Boston, Massachusetts 02114. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests will state the nature of the issues proposed to be raised in the hearing. Public hearings may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates a significant public interest. In reaching a final decision on the draft permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period and after a public hearing, if such a hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

XVI. EPA CONTACT

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

Jeanne Voorhees
U.S. Environmental Protection Agency
Office of Ecosystem Protection (CMU)
One Congress Street - Suite-1100
Boston, MA 02114

Telephone: (617) 918-1686

_____ Linda M. Murphy, Director

Date Office of Ecosystem Protection

U.S. Environmental Protection Agency

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Table 2. Outfall 001 Effluent Characteristics Based on Average Monthly Data

Date	Flow (MGD)		BOD_5 (mg/l)			BOD_5 % Removal	TSS (mg/l)			TSS % Removal	pH (su)		Total Residual Chlorine (ug/l)		*Fecal coliform* (cfu/100 ml)		LC50		C-NOEL 7-Day	
	Monthly Average	Maximum Daily	Monthly Average	Weekly Average	Maximum Daily	Monthly Average	Monthly Average	Weekly Average	Maximum Daily	Monthly Average	Minimum	Maximum	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Ceriodaphina	Pimephale	Ceriodaphina	Pimephale
Existing Limits	0.4	****	Footnote 1	Footnote 2	***	85%	Footnote 1	Footnote 2	***	85%	6.5	8.3	11.2	19.4	200	400	≥98	≥98	≥100	≥98
Apr. 2005	0.235	0.456	1.7	2.7	4.2	99	5.9	10.5	21	98	6.6	7.8	15	26	ND	ND	58.2	100	50	98
Mar. 2005	0.208	0.385	2.6	3.8	5.8	99	2.26	2.75	4.5	99	6.6	7.6	***	***	***	***	***	***	***	***
Feb. 2005	0.187	0.263	7.3	8.2	12	96.6	3.2	4.5	8.5	98.3	6.8	7.7	***	***	***	***	***	***	***	***
Jan. 2005	0.214	0.335	5.4	7.3	9.1	97	2.45	4.2	6	98.5	6.7	7.9	***	***	***	***	100	98	98	6.25
Dec. 2004	0.181	0.223	6.2	8.1	14	97	1.6	2.0	4.0	98.8	6.6	7.8	***	***	***	***	***	***	***	***
Nov. 2004	0.139	0.173	2.02	5.1	9.6	98.7	2.5	2.8	6	99	6.6	7.5	***	***	***	***	***	***	***	***
Oct. 2004	0.135	0.155	1.43	1.3	2.8	99	2.7	3.2	7.5	99	6.7	7.9	7.0	16.0	1.25	2	100	100	100	100
Sept. 2004	0.121	0.215	2.8	6.2	9.7	97	1.5	2.7	4.5	99	7.0	7.9	7.0	26	4.25	13	***	***	***	***
Aug. 2004	0.097	0.123	2.16	2.8	4.0	99	1.59	2.0	4.0	99	6.8	7.4	9.0	16	1.9	5.0	***	***	***	***
July 2004	0.0936	0.118	2.2	1.7	3.4	98	1.5	2.7	7.0	99	6.7	7.0	15	16	0.6	2.0	100	100	100	100
June 2004	0.119	0.165	2.88	4.6	7.4	98	1.75	2.3	3.5	99	6.5	6.9	10.7	20	2.1	3.0	***	***	***	***
May 2004	0.173	0.237	4.6	5.8	6.6	98	3.3	5.1	7.5	98	6.7	7.0	14	30	0.69	30	***	***	***	***
Apr. 2004	0.250	0.351	5.8	8.8	9.0	98	3.5	4.0	6.5	98	6.6	7.0	27	40	0.20	2.0	***	***	***	***
Mar. 2004	0.159	0.220	4.7	7.5	11	98	3.3	4.8	12.5	99	6.6	7.1	***	***	***	***	***	***	***	***
Feb. 2004	0.140	0.169	5.65	7.1	9.0	98	5.5	5.5	10	98	6.7	7.0	***	***	***	***	100	50	100	100
Jan. 2004	0.152	0.248	6.1	6.8	10	97	5.5	8.2	13.5	98	6.7	7.1	***	***	***	***	***	***	***	***

Date	Flow (MGD)		BOD_5 (mg/l)			BOD_5 % Removal	TSS (mg/l)			TSS % Removal	pH (su)		Total Residual Chlorine (ug/l)		*Fecal coliform* (cfu/100 ml)		LC50		C-NOEL 7-Day	
	Monthly Average	Maximum Daily	Monthly Average	Weekly Average	Maximum Daily	Monthly Average	Monthly Average	Weekly Average	Maximum Daily	Monthly Average	Minimum	Maximum	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Ceriodaphina	Pimephale	Ceriodaphina	Pimephale
Existing Limits	0.4	****	Footnote 1	Footnote 2	***	85%	Footnote 1	Footnote 2	***	85%	6.5	8.3	11.2	19.4	200	400	≥98	≥98	≥100	≥98
Dec. 2003	0.167	0.240	5.8	14	19	98	5.0	6.6	12.5	98	6.5	7.1	***	***	***	***	***	***	***	***
Nov. 2003	0.131	0.156	3.3	6.5	7.5	98	5.0	9.7	22	98	6.7	6.9	***	***	***	***	***	***	***	***
Oct. 2003	0.117	0.209	2.3	3.3	4.1	99	3.75	5.1	9.5	99	6.6	7.3	10	13	6.6	45	100	100	100	100
Sept. 2003	0.098	0.377	4.8	7.3	9.0	98	3.04	3.1	5.5	99	6.5	7.1	10	10	1.74	600	***	***	***	***
Aug. 2003	0.105	0.163	2.8	3.9	4.3	99	1.5	3.1	4.0	99	6.7	7.1	10	10	60	240	***	***	***	***
July 2003	0.113	0.143	2.1	3.5	3.9	98	1.5	3.6	6.5	99	6.5	7.5	20	20	1.2	2.0	100	100	100	100
June 2003	0.184	0.424	2.0	4.9	5.2	99	2.5	4.3	9.0	99	6.5	6.9	14	30	4.02	8	***	***	***	***
May 2003	0.134	0.207	2.7	4.7	7.0	99	3.25	5.2	7.5	98	6.7	7.1	19	30	0.7	10	***	***	***	***
Apr. 2003	0.216	0.311	2.8	3.0	8.0	96	4.5	7.1	11	97	6.5	7.0	18	33	1.6	3	100	100	100	100
Mar. 2003	0.200	0.317	2.6	4.0	6.0	98	4.7	7.8	10.5	98	6.8	7.0	***	***	***	***	***	***	***	***
Feb. 2003	0.137	0.202	3.7	4.4	5.6	98	3.5	9.6	10	99	6.7	7.62	***	***	***	***	***	***	***	***
Jan. 2003	0.176	0.214	4.4	5.7	6.0	98	4.2	7.4	10.9	99	6.7	7.3	***	***	***	***	***	***	***	***
Maximum	0.25	0.424	6.2	14	19	99	5.5	9.7	22	99	7	7.9	27	40	60	600	100	100	100	100
Minimum	0.0936	0.118	1.43	1.3	2.8	96	1.5	2	3.5	97	6.5	6.9	7	10	0.2	2	100	50	100	100
Average	0.1474	0.223	3.58	5.46	7.6	98.1	3.195	4.92	8.56	98.6	6.7	7.2	14	22.1	6.20	68.9	100	91.7	100	100

[1]Monthly Ave. & Weekly Ave: May 1 - Oct 31; 12 mg/l & 20 mg/l, respectively
[2]Monthly Ave. & Weekly Ave: Nov 1 - Apr 30; 22 mg/l & 34 mg/l, respectively
*** Data Not Required

Table 3. Outfall 001 Effluent Characteristics of Metals Based on Average Monthly Data

Date	Cadmium (ug/l)*		Copper (ug/l)		Lead (ug/l)		Zinc (ug/)		Aluminum (ug/l)		pH (su)		C-NOEL 7-Day		LC50	
	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Minimum	Maximum	Ceriodaphina	Pimephles	Ceriodaphina	Pimephles
Existing Limits	0.19	1.5	6.0	8.6	1.62	Report	77	77	88.7	765	6.5	8.3	≥98%	≥98%	≥100%	≥100%
Apr. 2005	ND	ND	5.3	5.3	ND	ND	50	50	ND	ND	6.6	7.8	58.2	100	50	98
Mar. 2005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.6	7.6	***	***	***	***
Feb. 2005	ND	ND	ND	ND	ND	ND	60	60	84	84	6.8	7.7	***	***	***	***
Jan. 2005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.7	7.9	100	98	98	6.25
Dec. 2004	ND	ND	7.7	8.1	ND	ND	ND	ND	ND	ND	6.6	7.8	***	***	***	***
Nov. 2004	ND	ND	9.1	12.0	ND	ND	ND	ND	ND	ND	6.6	7.5	***	***	***	***
Oct. 2004	ND	ND	20	23	ND	ND	ND	ND	ND	ND	6.7	7.9	100	100	100	100
Sept. 2004	ND	ND	26	32	ND	ND	ND	ND	122	330	7.0	7.9	***	***	***	***
Aug. 2004	ND	ND	24	24	ND	ND	ND	ND	ND	ND	6.8	7.4	***	***	***	***
July 2004	ND	ND	37	40	ND	ND	52	52	80	120	6.7	7.0	100	100	100	100
June 2004	ND	ND	31	43	ND	ND	ND	ND	158	250	6.5	6.9	***	***	***	***
May 2004	ND	ND	9.6	13	ND	ND	ND	ND	165	240	6.7	7.0	***	***	***	***
Apr. 2004	ND	ND	11.3	16	ND	ND	ND	ND	220	310	6.6	7.0	***	***	***	***
Mar. 2004	ND	ND	14.4	20	ND	ND	ND	ND	211	270	6.6	7.1	***	***	***	***
Feb. 2004	ND	ND	40	40	ND	ND	16.6	50	106	120	6.7	7.0	100	50	100	100
Jan. 2004	ND	ND	20	20	ND	ND	50	50	110	110	6.7	7.1	***	***	***	***
Dec. 2003	ND	ND	30	30	ND	ND	ND	ND	390	390	6.5	7.1	***	***	***	***
Nov. 2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.7	6.9	***	***	***	***

Date	Cadmium (ug/l)*		Copper (ug/l)		Lead (ug/l)		Zinc (ug/)		Aluminum (ug/l)		pH (su)		C-NOEL 7-Day		LC50	
	MonthlyAverage	Maximum Daily	MonthlyAverage	Maximum Daily	MonthlyAverage	Maximum Daily	Monthly Average	Maximum Daily	MonthlyAverage	Maximum Daily	Minimum	Maximum	Ceriodaphina	Pimephles	Ceriodaphina	Pimephles
Existing Limits	0.19	1.5	6.0	8.6	1.62	Report	77	77	88.7	765	6.5	8.3	≥98%	≥98%	≥100%	≥100%
Oct. 2003	ND	ND	10	10	ND	ND	50	50	120	120	6.6	7.3	100	100	100	100
Sept. 200	ND	ND	20	20	ND	ND	50	50	ND	ND	6.5	7.1	***	***	***	***
Aug. 2003	***	***	10	10	ND	ND	60	60	ND	ND	6.7	7.1	***	***	***	***
July 2003	ND	ND	20	20	ND	ND	ND	ND	ND	ND	6.5	7.5	100	100	100	100
June 2003	ND	ND	10	10	ND	ND	ND	ND	200	200	6.5	6.9	***	***	***	***
May 2003	ND	ND	20	20	ND	ND	ND	ND	150	170	6.7	7.1	***	***	***	***
Apr. 2003	ND	ND	10	10	ND	ND	ND	ND	ND	ND	6.5	7.0	100	100	100	100
Mar. 2003	ND	ND	10	10	ND	ND	ND	ND	ND	ND	6.8	7.0	***	***	***	***
Feb. 2003	ND	ND	20	20	ND	ND	50	50	ND	ND	6.7	7.62	***	***	***	***
Jan. 2003	ND	ND	20	20	ND	ND	ND	ND	120	120	6.7	7.3	***	***	***	***
Maximum			40	43			60	60	390	390	7	7.9	100	100	100	100
Minumum			7.7	8.1			16.6	50	80	110	6.5	6.9	100	50	100	100
Average			18.7	20.48			46.9	51.7	165.5	211.5	6.65	7.23	100	91.67	100	100

*The current permit defined the minimum detection level (ML) for cadmium as 2 ug/l. However, the laboratory method used to quantify total cadmium applied an ML of 5 ug/l (per. com. Ron San Souci, August 24, 2005). Thus, results reported for total cadmium on the DMRs are flawed. Furthermore, a more recent ML has been established as 0.5 ug/l for total cadmium. This ML provides a more sensitive test for the average monthly limit (0.19 ug/l). Therefore, because the average monthly limit is lower than the ML, compliance/non-compliance, for this effluent limit only, will be determined based on the ML. Sample results of less than 0.5 ug/l for the average monthly value will be reported as zero on the DMRs.

*** No data

Table 4. Outfall 001 Effluent Characteristics of Nutrients Based on Average Monthly Data **MA0100196**

Date	Flow (MGD)		Nitrogen, Ammonia (mg/l)[1]	Nitrogen, Nitrite (mg/l)	Nitrogen, Nitrate (mg/l)	Nitrogen, Kjeldahl (mg/l)	Total Phosphorus (mg/l)	
	Monthly Average	Maximum Daily	Monthly Average	Monthly Average	Monthly Average	Monthly Average	Monthly Average	Maximum Daily
Existing Limits	0.4	***	See Footnote 1	Report	Report	Report	See Footnote 2	Report
Apr. 2005	0.235	0.456	2.7	ND	7.8	0.34	0.07	0.15
Mar. 2005	0.208	0.385	0.359	0.32	5.6	1.5	0.056	0.08
Feb. 2005	0.187	0.263	3.30	0.34	3.0	6.8	0.025	0.04
Jan. 2005	0.214	0.335	3.19	0.05	7.6	3.8	0.02	0.03
Dec. 2004	0.181	0.223	2.6	0.50	15	1.8	0.03	0.04
Nov. 2004	0.139	0.173	4.10	0.10	10	4.4	0.05	0.09
Oct. 2004	0.135	0.155	0.02	ND	22	ND	0.032	0.04
Sept. 2004	0.121	0.215	0.046	ND	26	ND	0.062	0.09
Aug. 2004	0.097	0.123	0.052	ND	19	ND	0.114	0.26
July 2004	0.0936	0.118	0.124	ND	23	ND	0.16	0.20
June 2004	0.119	0.165	0.310	1.1	6.7	0.24	0.12	0.19
May 2004	0.173	0.237	7.0	0.67	2.2	9.2	0.05	0.07
Apr. 2004	0.250	0.351	5.49	4.6	2.7	4.4	0.095	0.12
Mar. 2004	0.159	0.220	8.8	22	18	18	0.13	0.18
Feb. 2004	0.140	0.169	16.7	13	20	20	0.21	0.25
Jan. 2004	0.152	0.248	7.0	ND	15	1.8	0.19	0.26
Dec. 2003	0.167	0.240	0.211	ND	19	1.3	0.15	0.25
Nov. 2003	0.131	0.156	0.86	ND	22	ND	0.14	0.31
Oct. 2003	0.117	0.209	0.616	0.12	20	19	0.132	0.20
Sept. 2003	0.098	0.377	1.74	ND	24	0.15	0.33	0.49
Aug. 2003	0.105	0.163	0.25	ND	16	ND	0.22	0.31
July 2003	0.113	0.143	0.25	ND	14	ND	0.13	0.21
June 2003	0.184	0.424	0.132	ND	15	1.2	0.10	0.17
May 2003	0.134	0.207	1.14	ND	16	0.33	0.18	0.26
Apr. 2003	0.216	0.311	3.88	ND	3.3	7.1	0.15	0.27
Mar. 2003	0.200	0.317	8.5	0.09	2.8	12	0.13	0.14
Feb. 2003	0.137	0.202	11.48	0.13	1.9	11	0.195	0.43
Jan. 2003	0.176	0.214	6.12	3.1	7.7	ND	0.136	0.16
Maximum	0.25	0.42	16.7	22	26	20	0.33	0.49

Date	Flow (MGD)		Nitrogen, Ammonia (mg/l)[1]	Nitrogen, Nitrite (mg/l)	Nitrogen, Nitrate (mg/l)	Nitrogen, Kjeldahl (mg/l)	Total Phosphorus (mg/l)	
	MonthlyAverage	Maximum Daily	MonthlyAverage	MonthlyAverage	MonthlyAverage	MonthlyAverage	MonthlyAverage	Maximum Daily
Existing Limits	0.4	***	See Footnote 1	Report	Report	Report	See Footnote 2	Report
Minumum	0.1	0.12	0.02	0.09	1.9	0.15	0.03	0.04
Average	0.147	0.223	3.643	4.13	14.22	6.995	0.1348	0.21

[1] Monthly Average Limits: May 1-October 31, 2.3 mg/l; November 1-April 30, 7.0 mg/l

[2] Monthly Average Limit applies May 1 - October 31, 0.20 mg/l; November 1-April 30, report only